

Figure 6-13. Radial Displacement at Elevation 8.9M, 3DCM Run 5 Compared to Axisymmetric

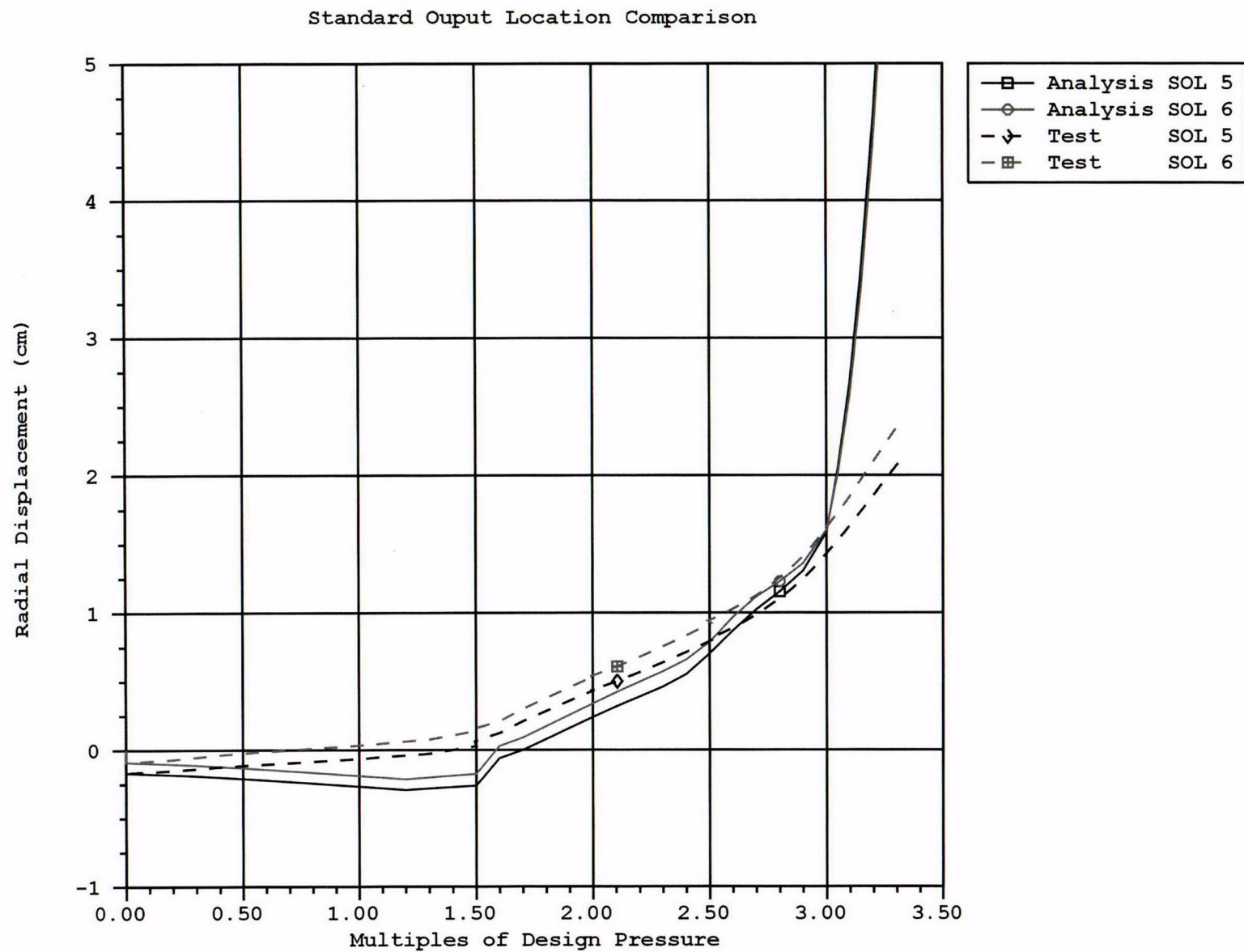


Figure 6-14. Comparison of Run 4 SOL 5 and 6 (Radial Displacement at 135 Degrees, 4.7M, 6.2M)

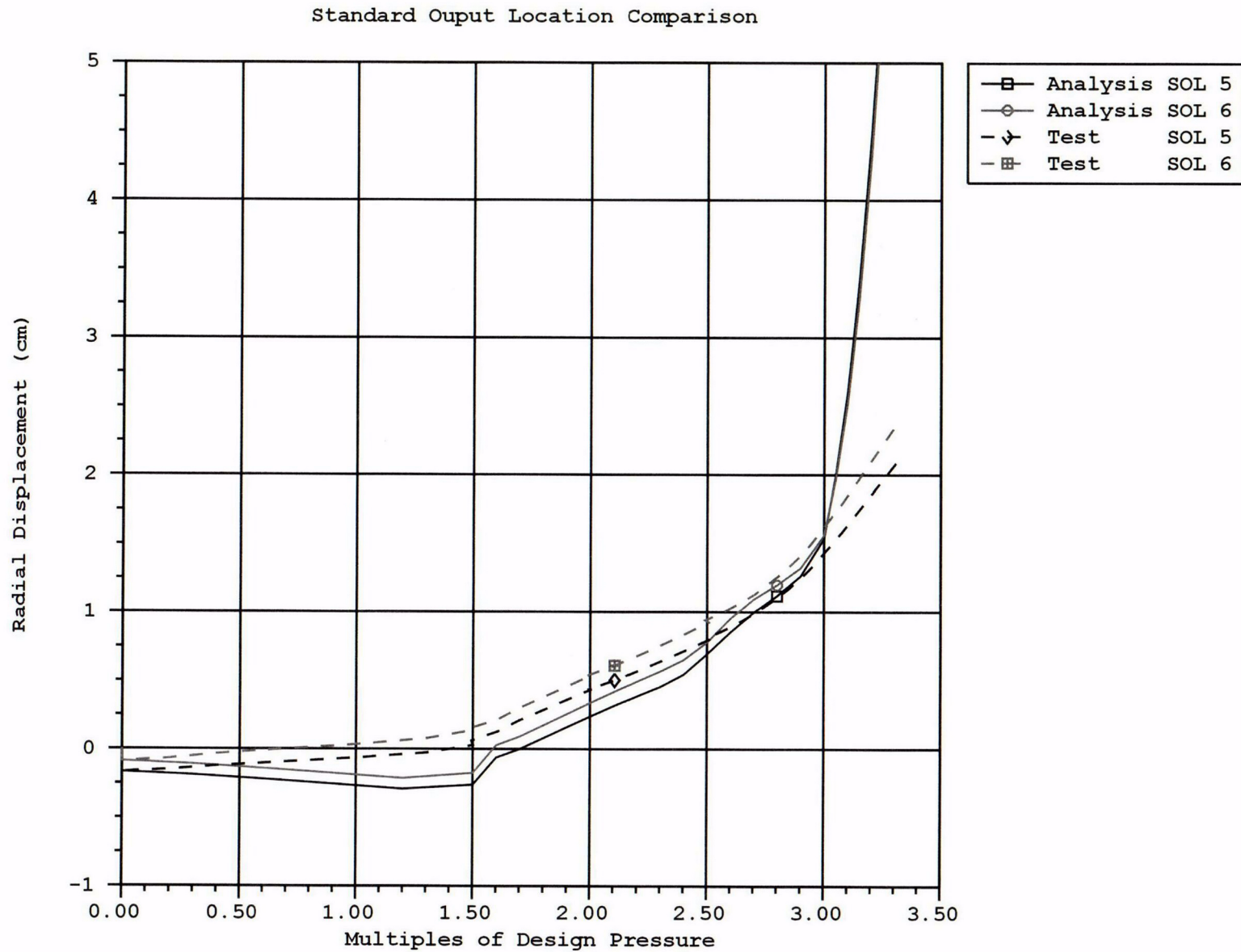


Figure 6-15. Comparison of Run 5 SOL 5 and 6 (Radial Displacement at 135 Degrees, 4.7M, 6.2M)

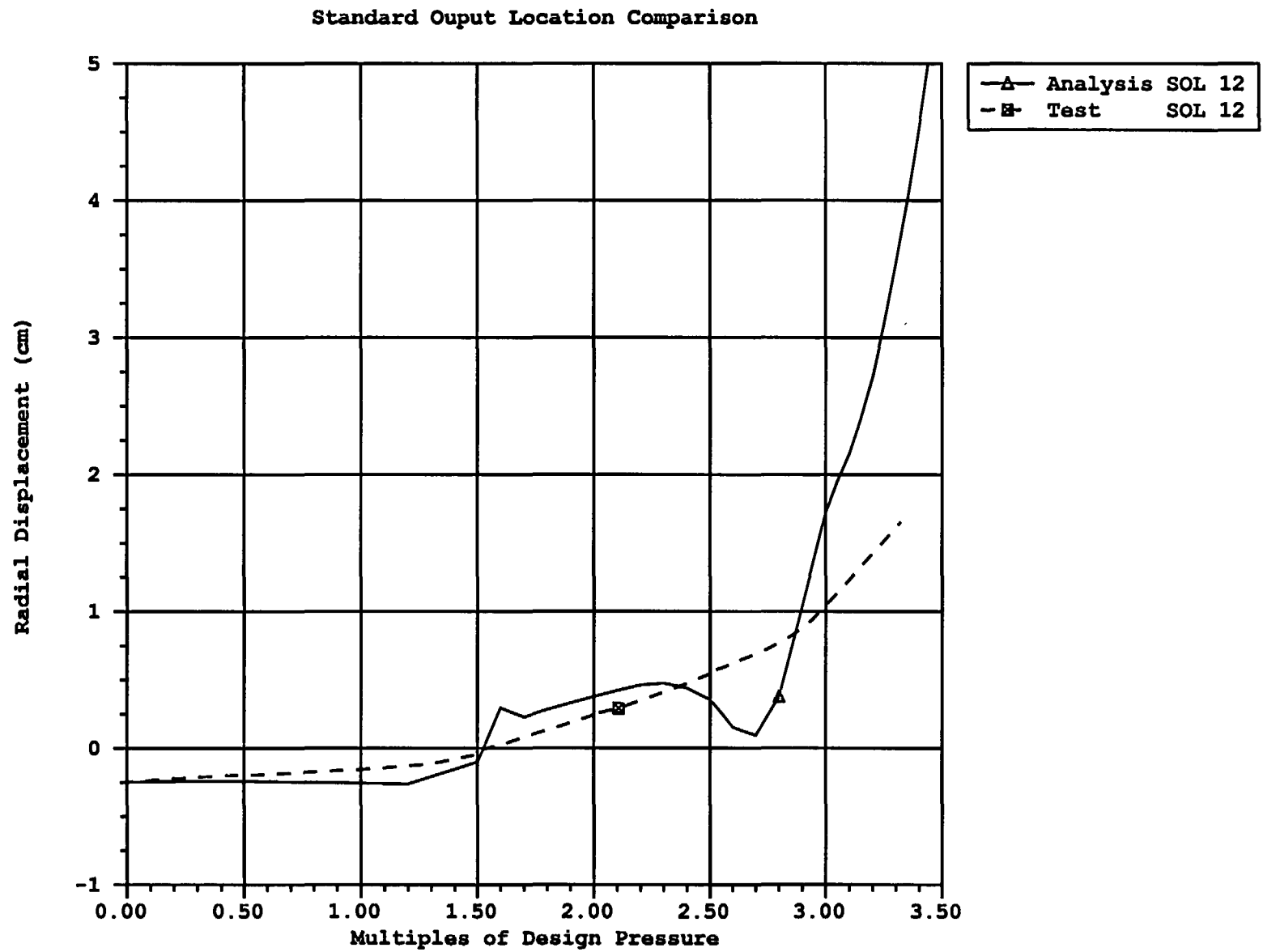


Figure 6-16. Comparison of Run 4 SOL 12 (Radial Displacement at 90 Degrees Butress, 6.2M)

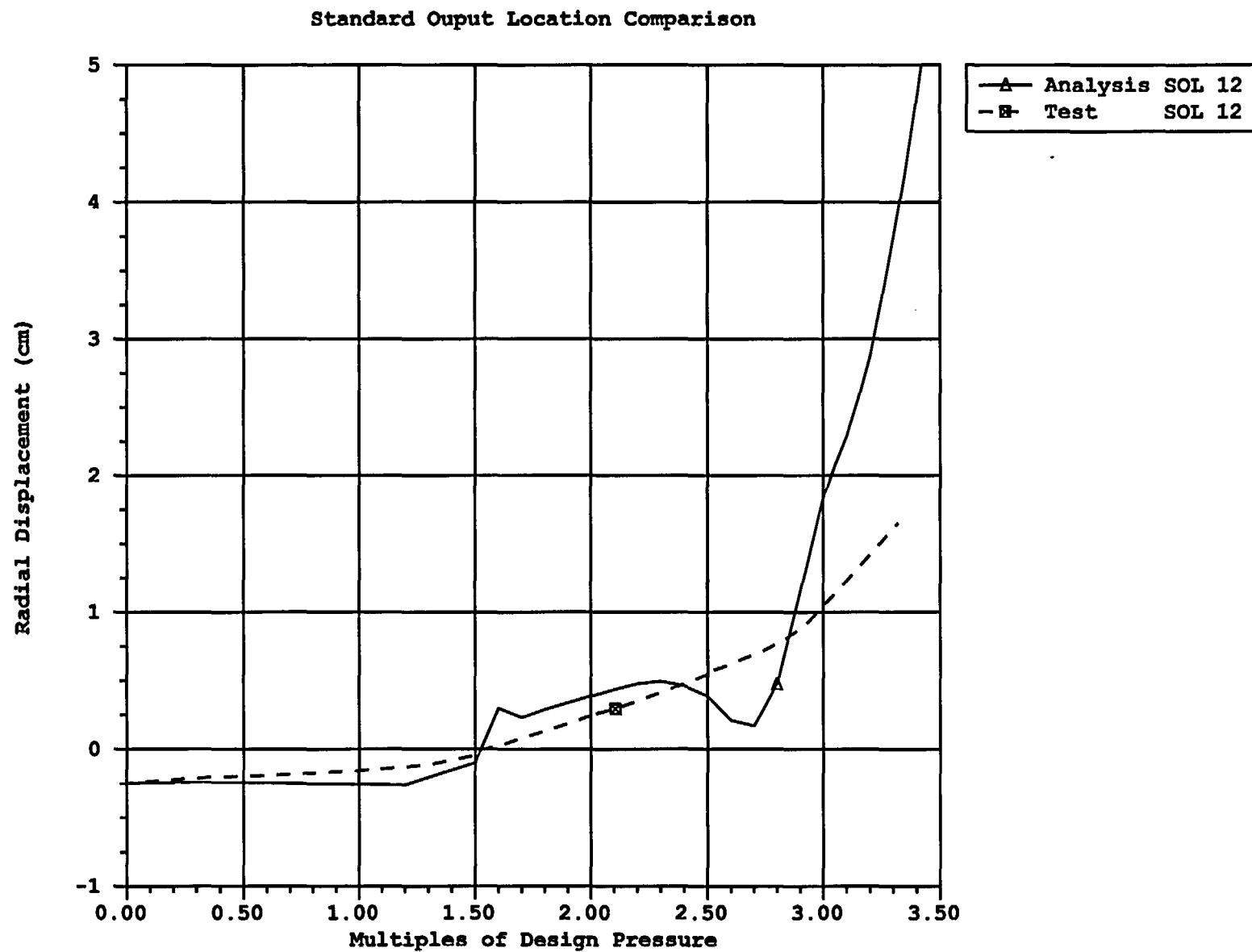


Figure 6-17. Comparison of Run 5 SOL 12 (Radial Displacement at 90 Degrees Butress, 6.2M)

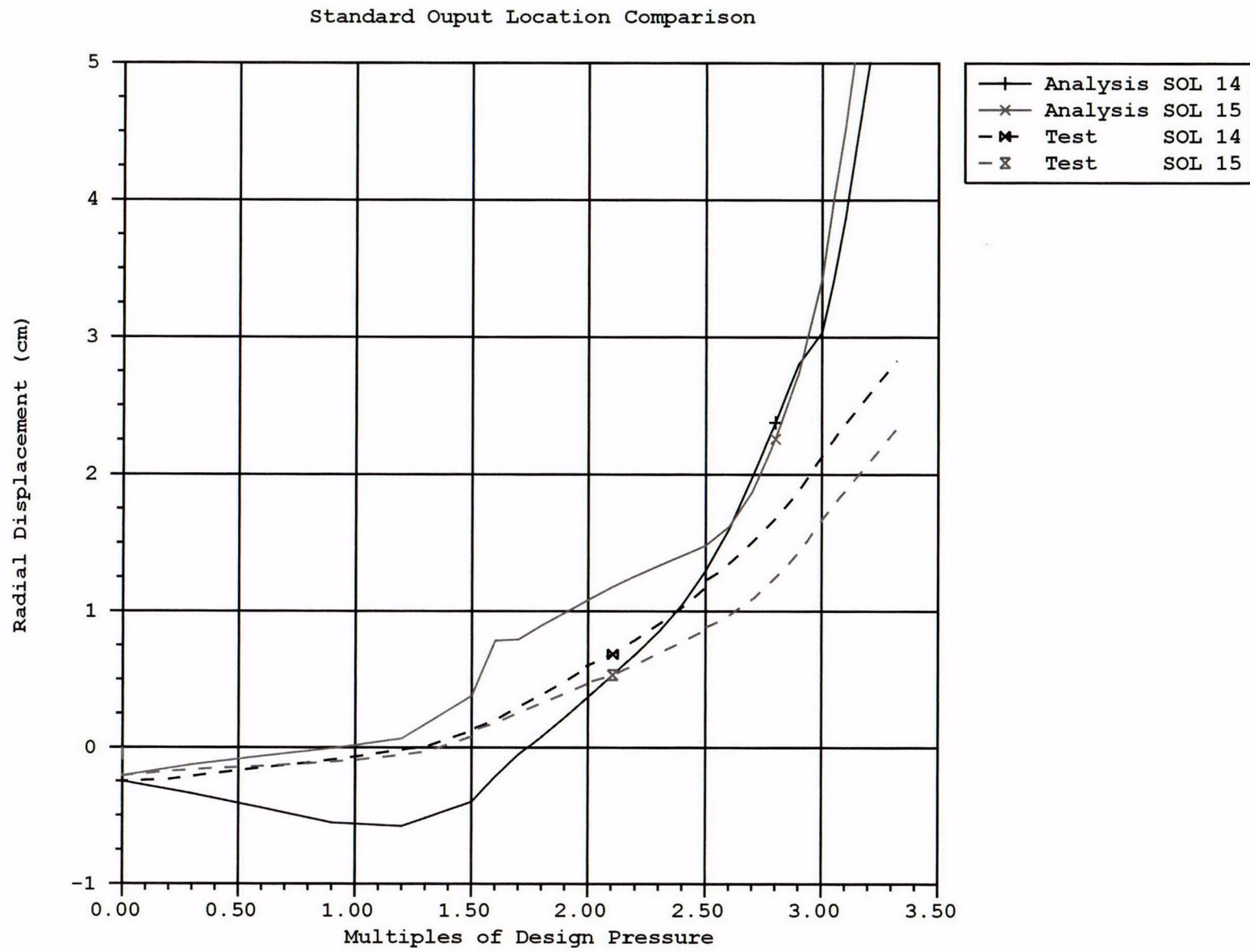


Figure 6-18. Comparison of Run 4 SOL 14 and 15 (Radial Displacement at E/H and A/L)

Standard Output Location Comparison

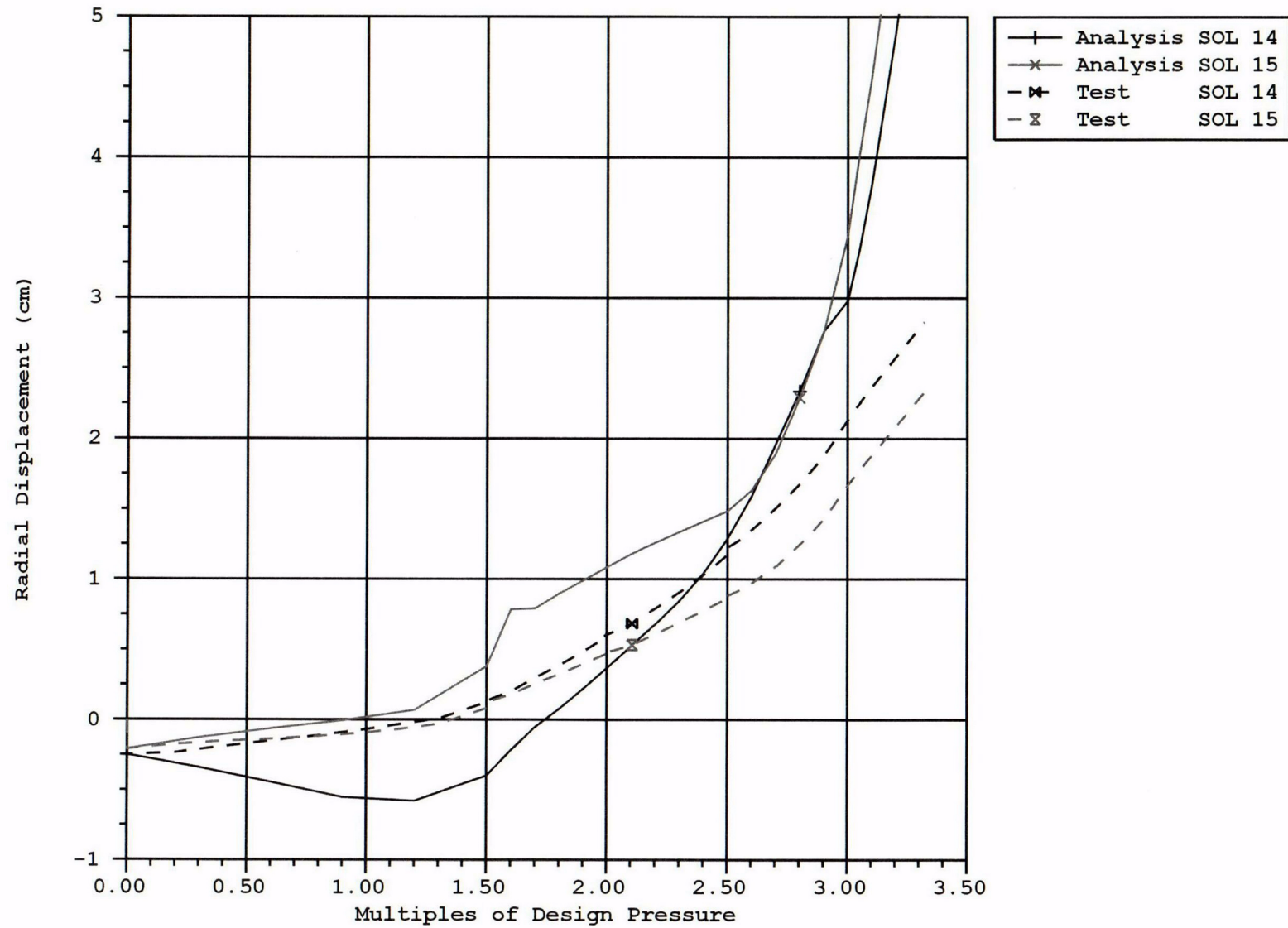


Figure 6-19. Comparison of Run 5 SOL 14 and 15 (Radial Displacement at E/H and A/L)

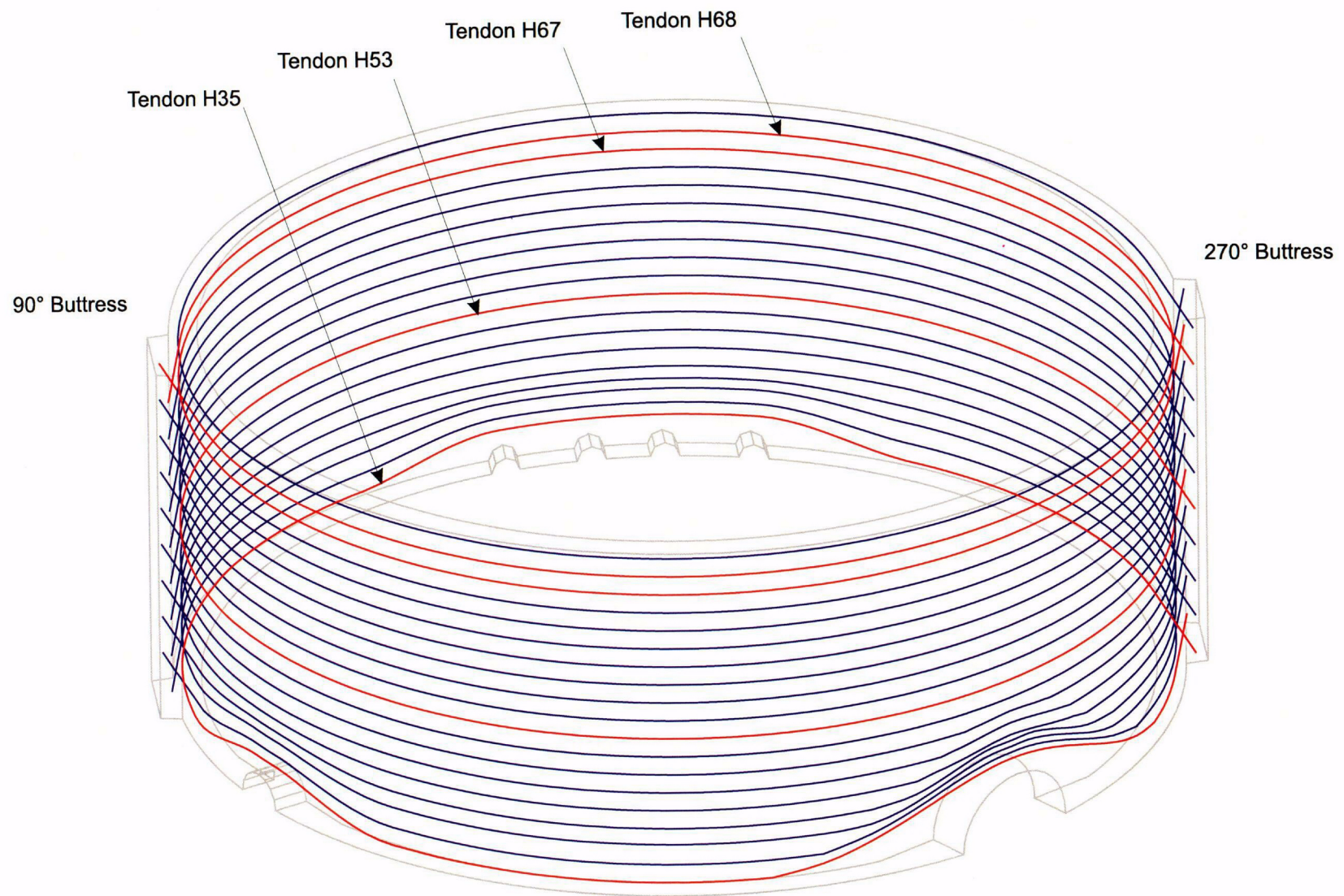
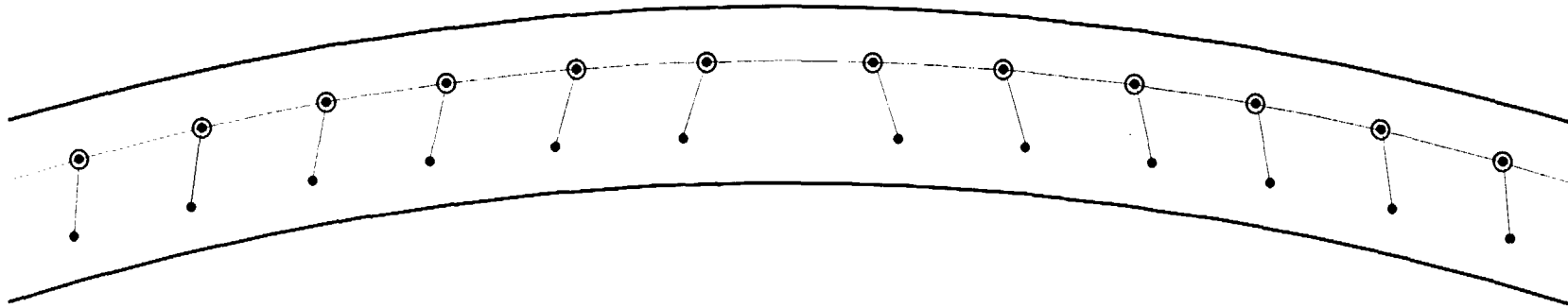


Figure 6-20. Location of Instrumented Tendons H35, H53, H67, and H68

Step 1. Apply Post-Tensioning with Original Friction Element Modeling

○ Concrete Node
• Tendon Node
• Friction Node



Step 2. After Post-Tensioning Lock-in Post-Tension effects.

- Remove Friction Elements
- Numerically Constrain Tendon Nodes to Concrete Nodes in Deformed Position

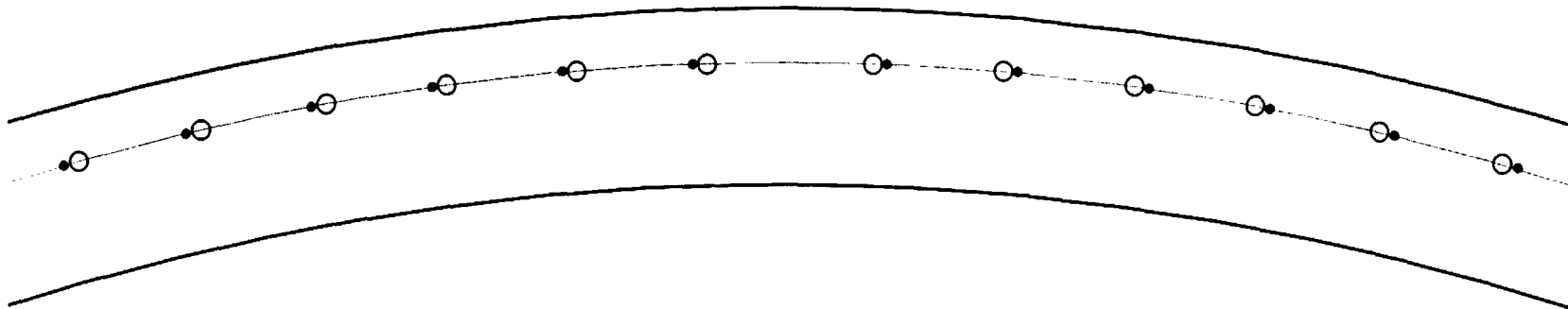
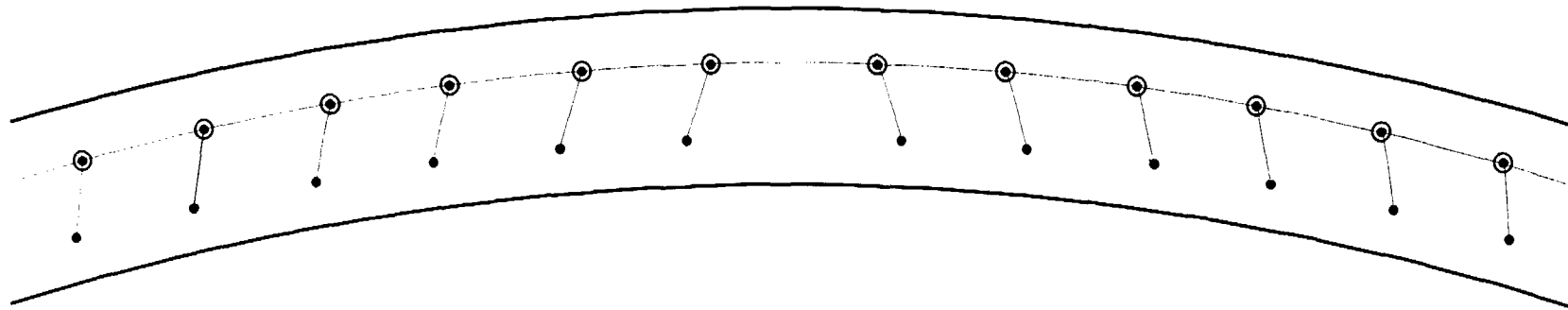


Figure 6-21. Tendon Friction Modeling Schematic for Run 6

Step 1. Apply Post-Tensioning with Original Friction Element Modeling

○ Concrete Node
• Tendon Node
• Friction Node



Step 2. At 1.5 Pd Realign Friction Elements to Radial Position - No Friction Assumption

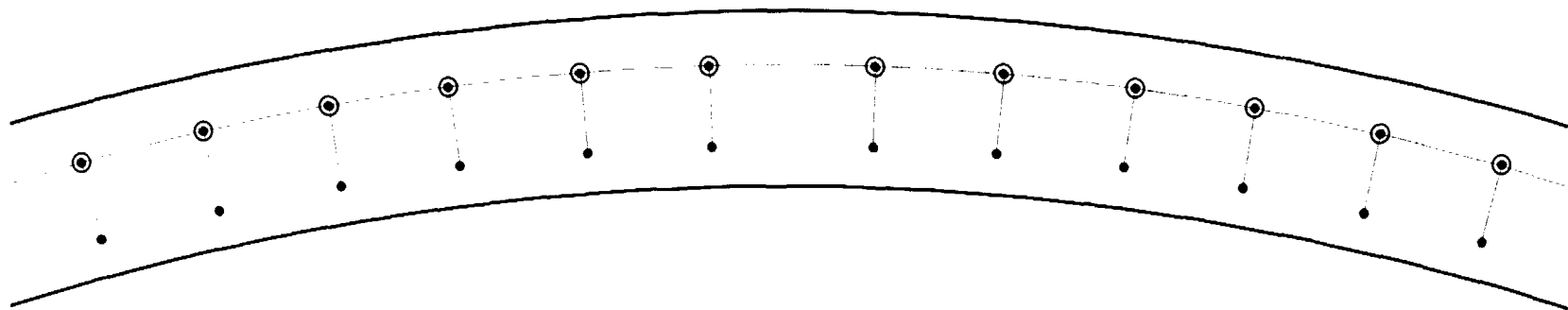
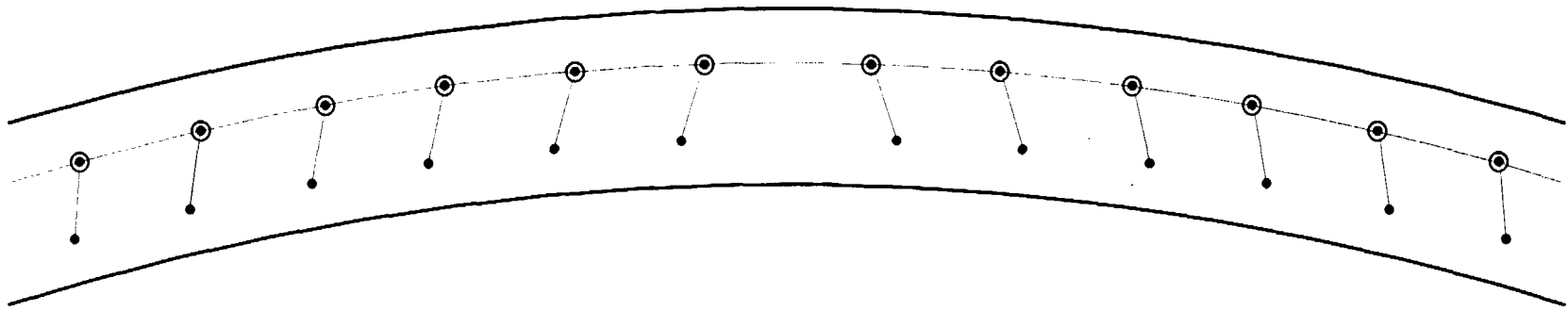


Figure 6-22. Tendon Friction Modeling Schematic for Run 7

Step 1. Apply Post-Tensioning with Original Friction Element Modeling

○ Concrete Node
• Tendon Node
• Friction Node



Step 2. After Post-Tensioning Add Second Series of Friction Elements Strain Free with Opposite Orientation

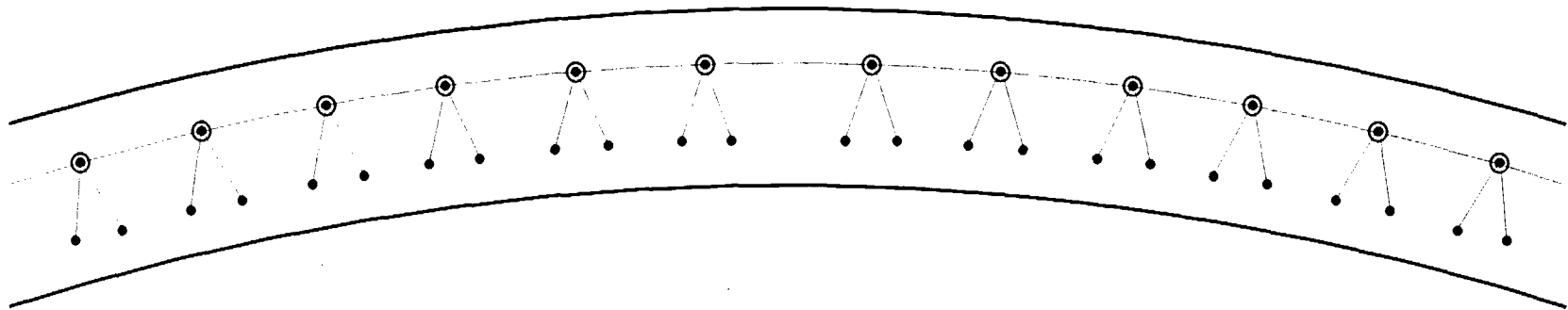


Figure 6-23. Tendon Friction Modeling Schematic for Run 9

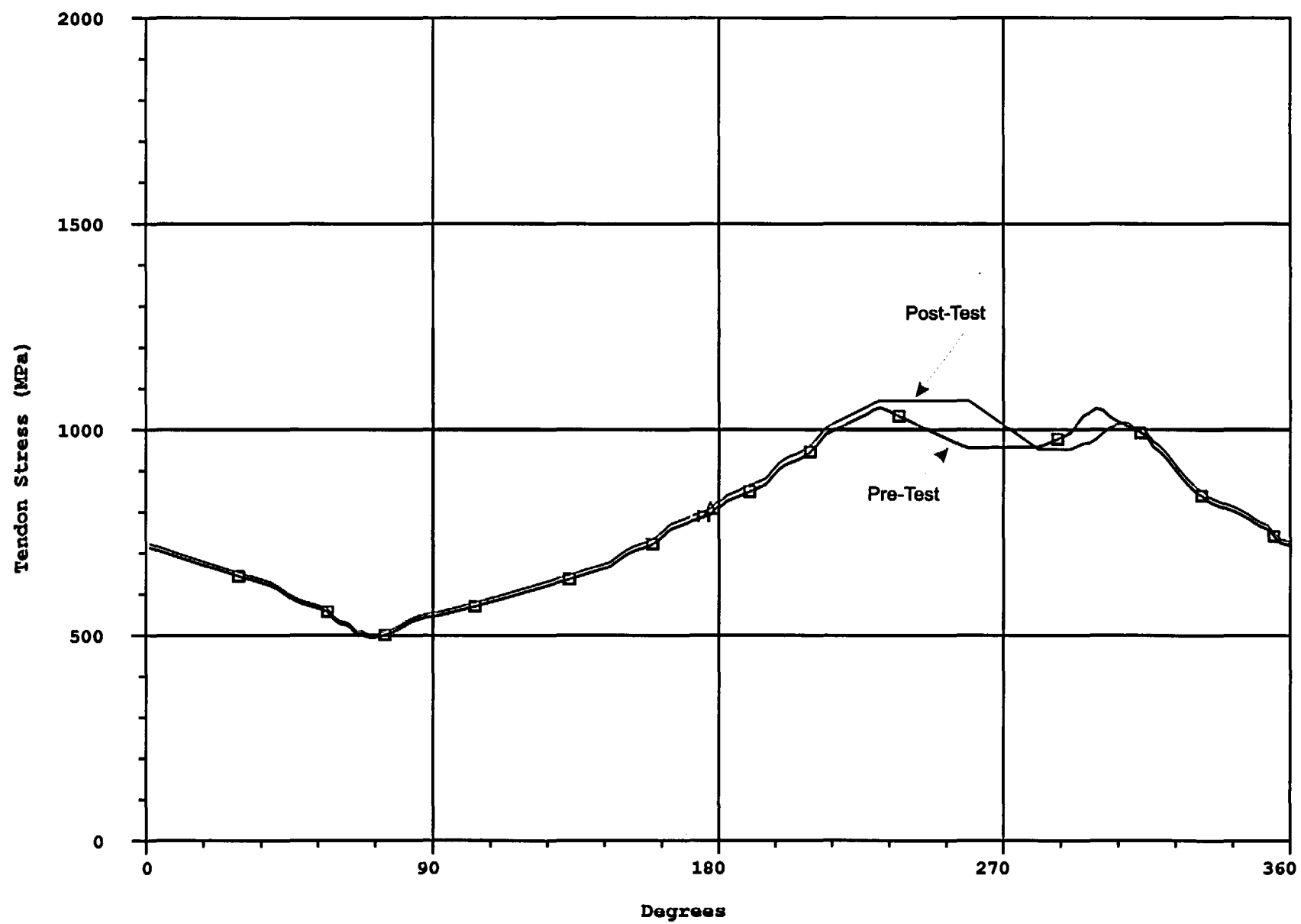


Figure 6-24. Changes to Anchor Set Prestress for Posttest 3DCM Study, Tendon H35

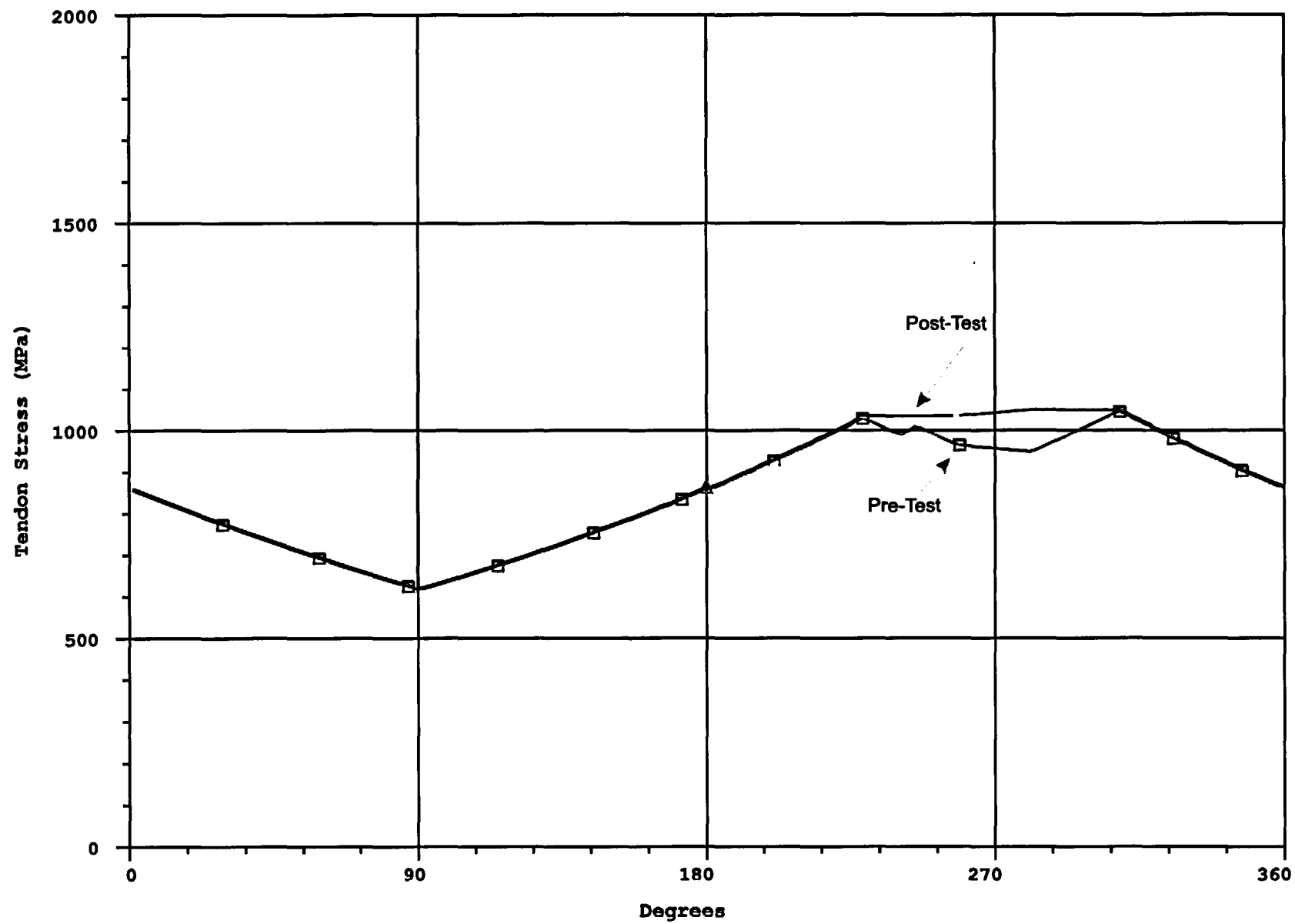


Figure 6-25. Changes to Anchor Set Prestress for Posttest 3DCM Study, Tendon H53

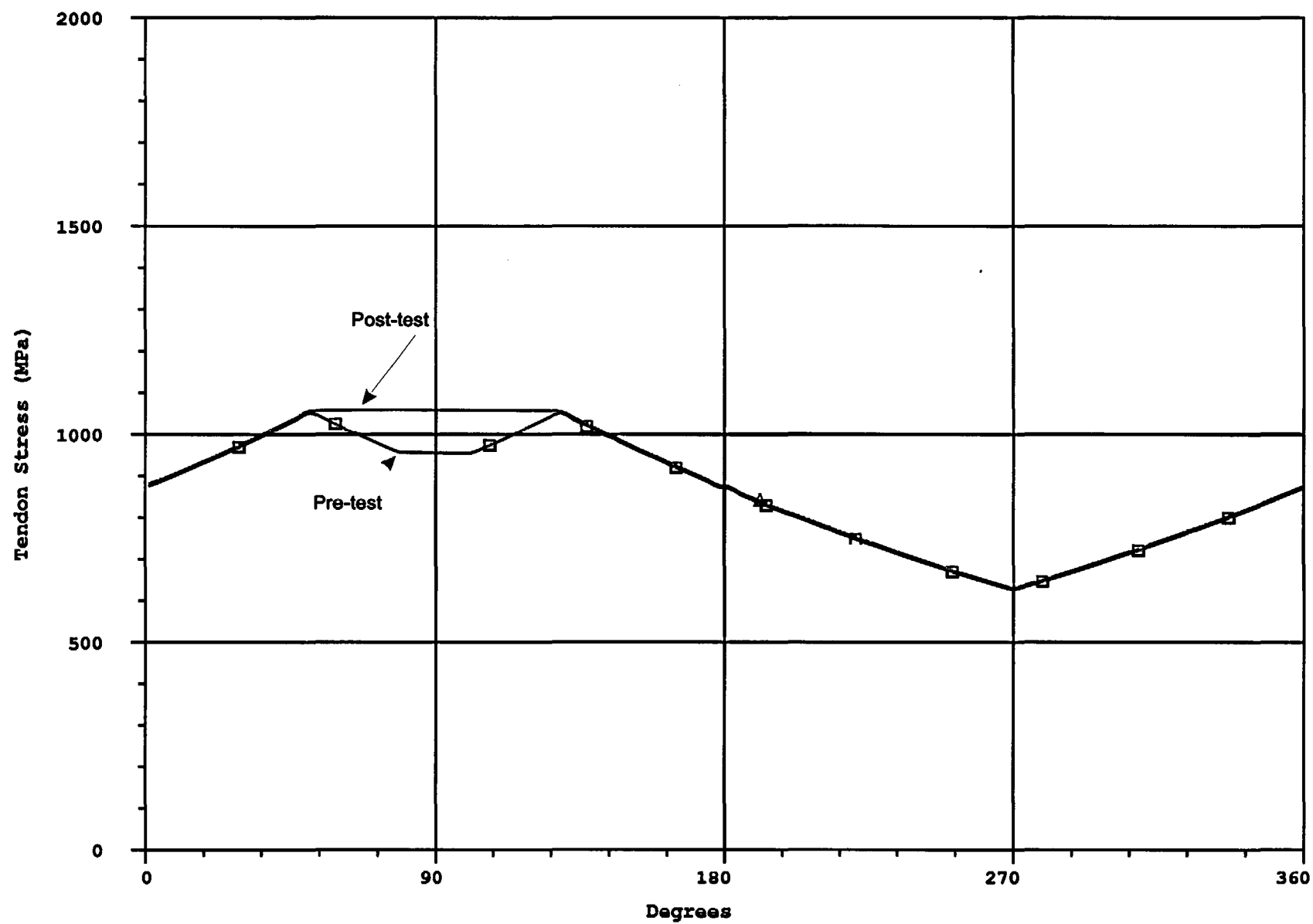


Figure 6-26. Changes to Anchor Set Prestress for Posttest 3DCM Study, Tendon H68

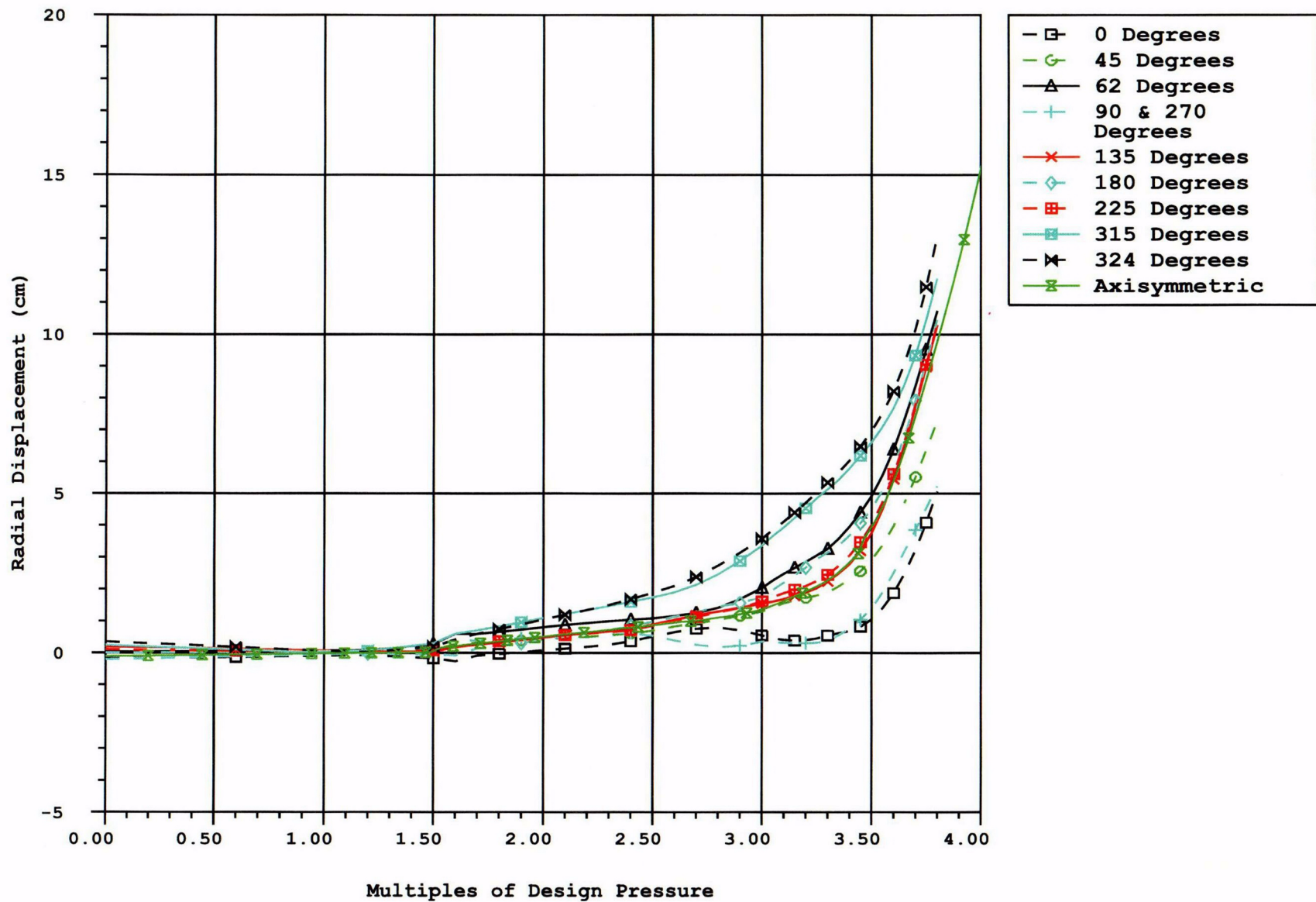


Figure 6-27. Radial Displacement at Elev. 4.7M, Posttest 3DCM Run 6
(Tendons "Bonded" After Prestressing) Compared to Axisymmetric

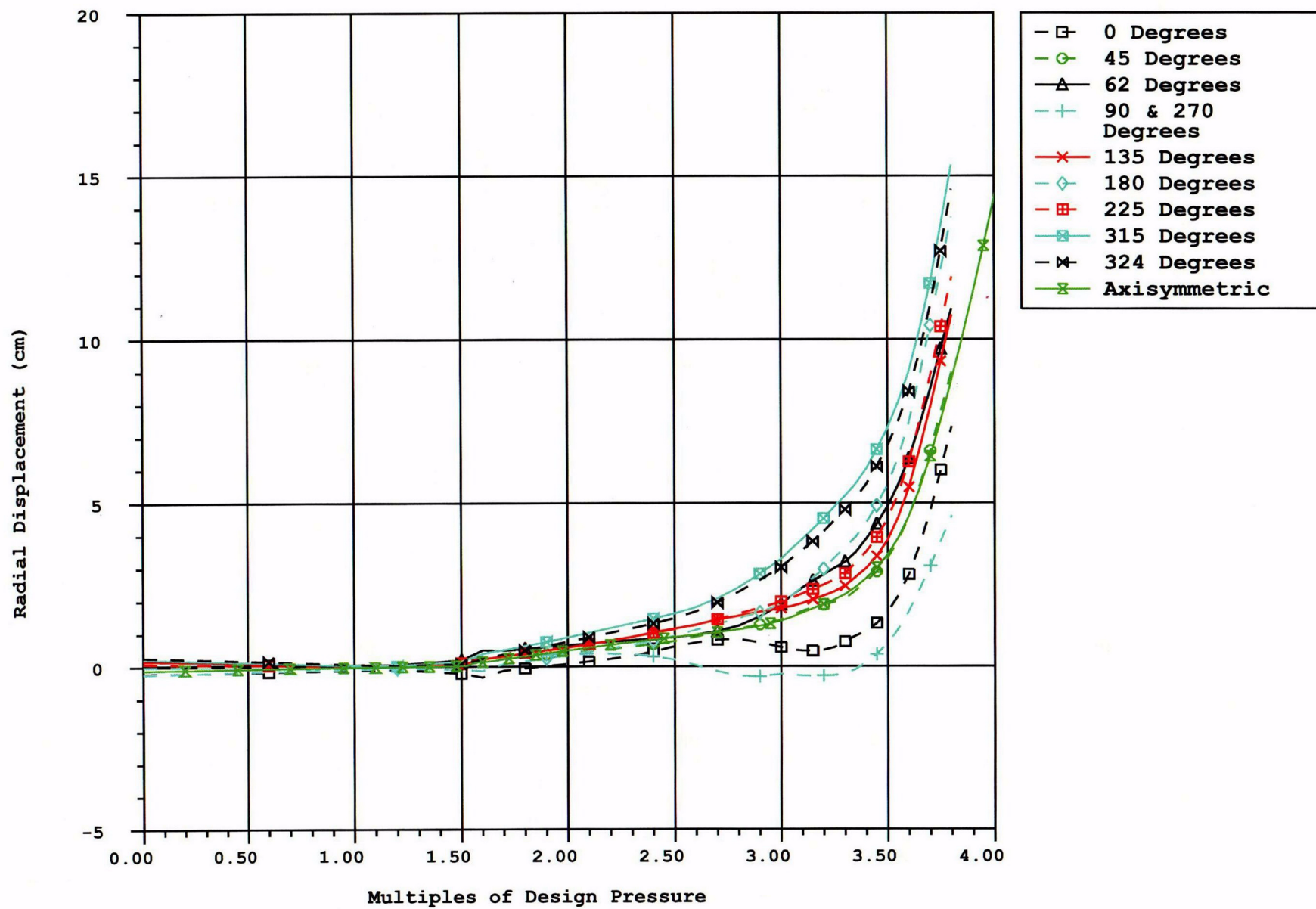


Figure 6-28. Radial Displacement at Elev. 6.2M, Posttest 3DCM Run 6 Compared to Axisymmetric

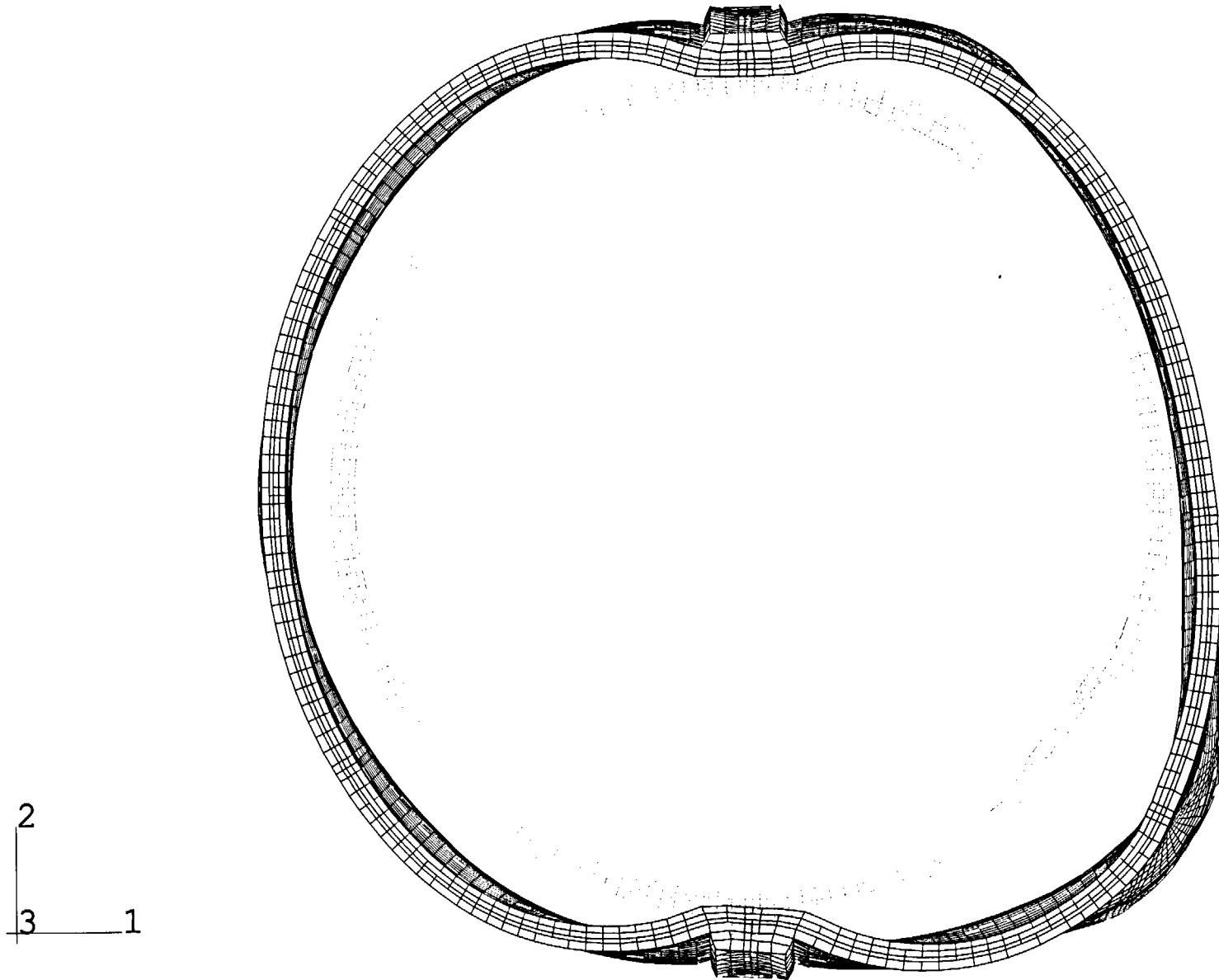


Figure 6-29. 3DCM Posttest Deformed Shape at $P = 2.5P_d$, Run 6 (mag. Factor = 100 \times)

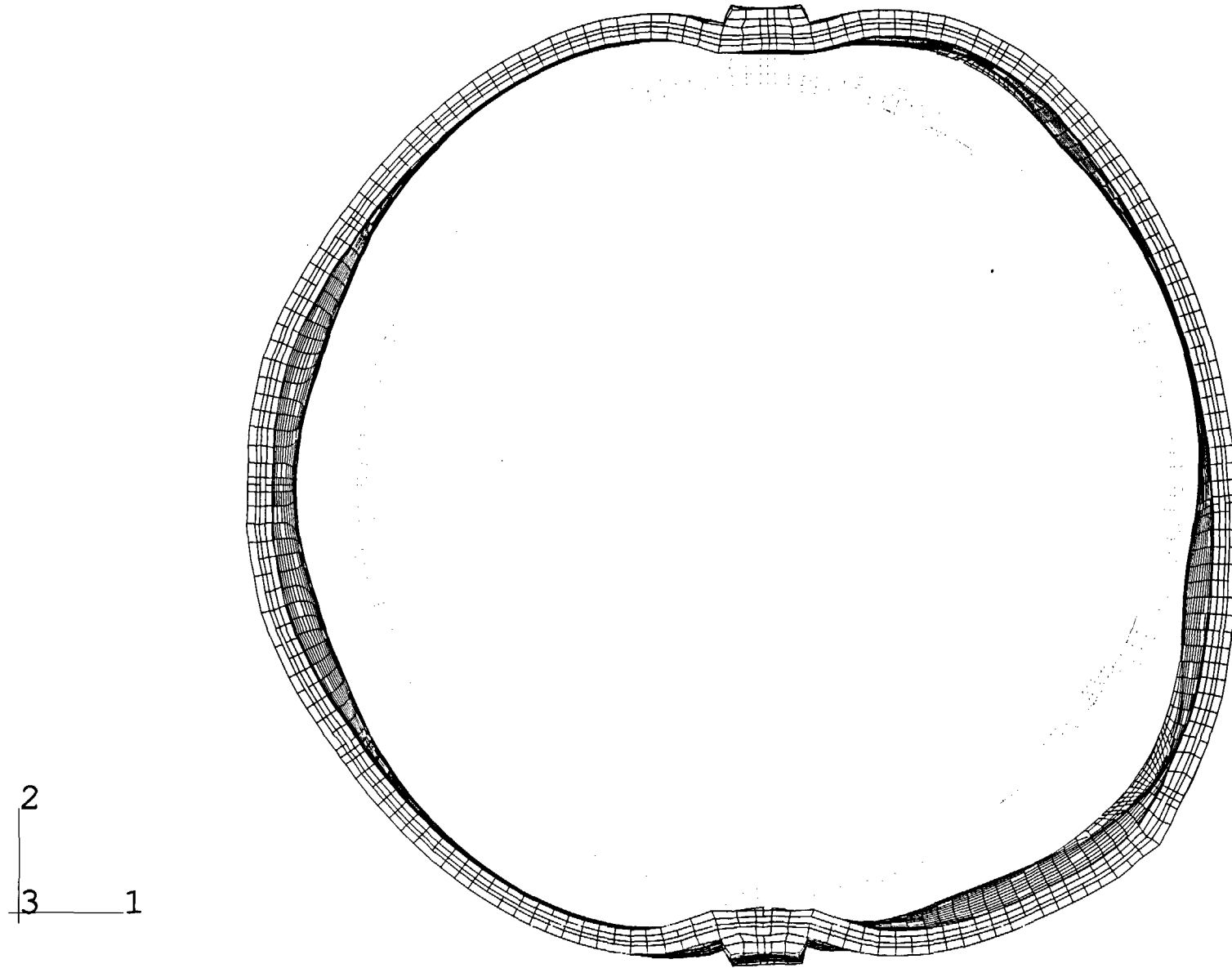


Figure 6-30. 3DCM Posttest Deformed Shape at $P = 3.8P_d$, Run 6 (mag. Factor = $10\times$)

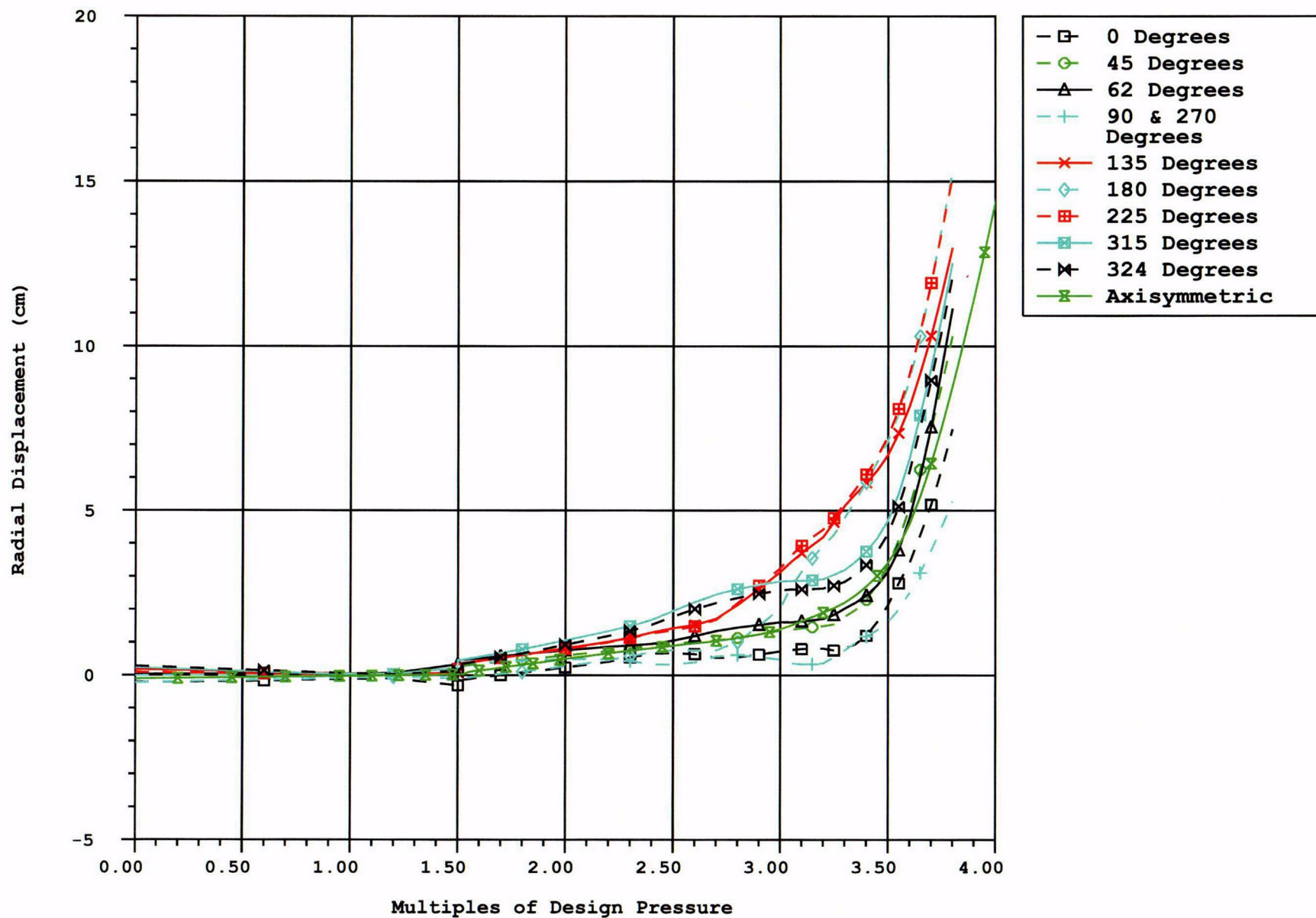


Figure 6-31. Radial Displacement at Elev. 6.2M, Posttest 3DCM Run 7
(No Friction After Prestress is Overcome) Compared to Axisymmetric

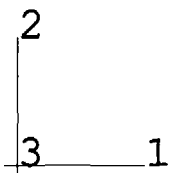
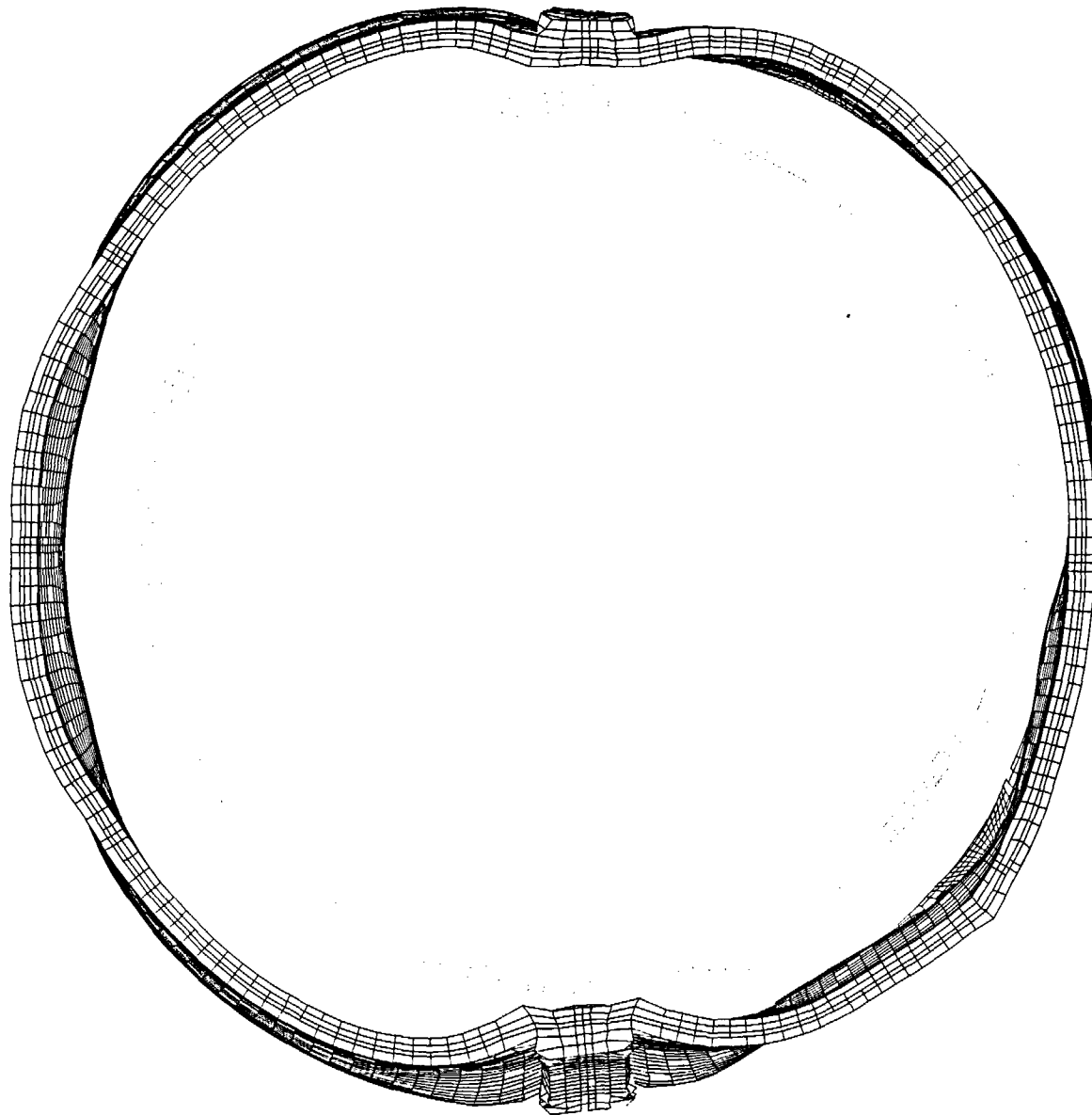


Figure 6-32. 3DCM Posttest Deformed Shape at $P = 2.0 \text{ Pd}$, Run 7 (mag. Factor = 100x)

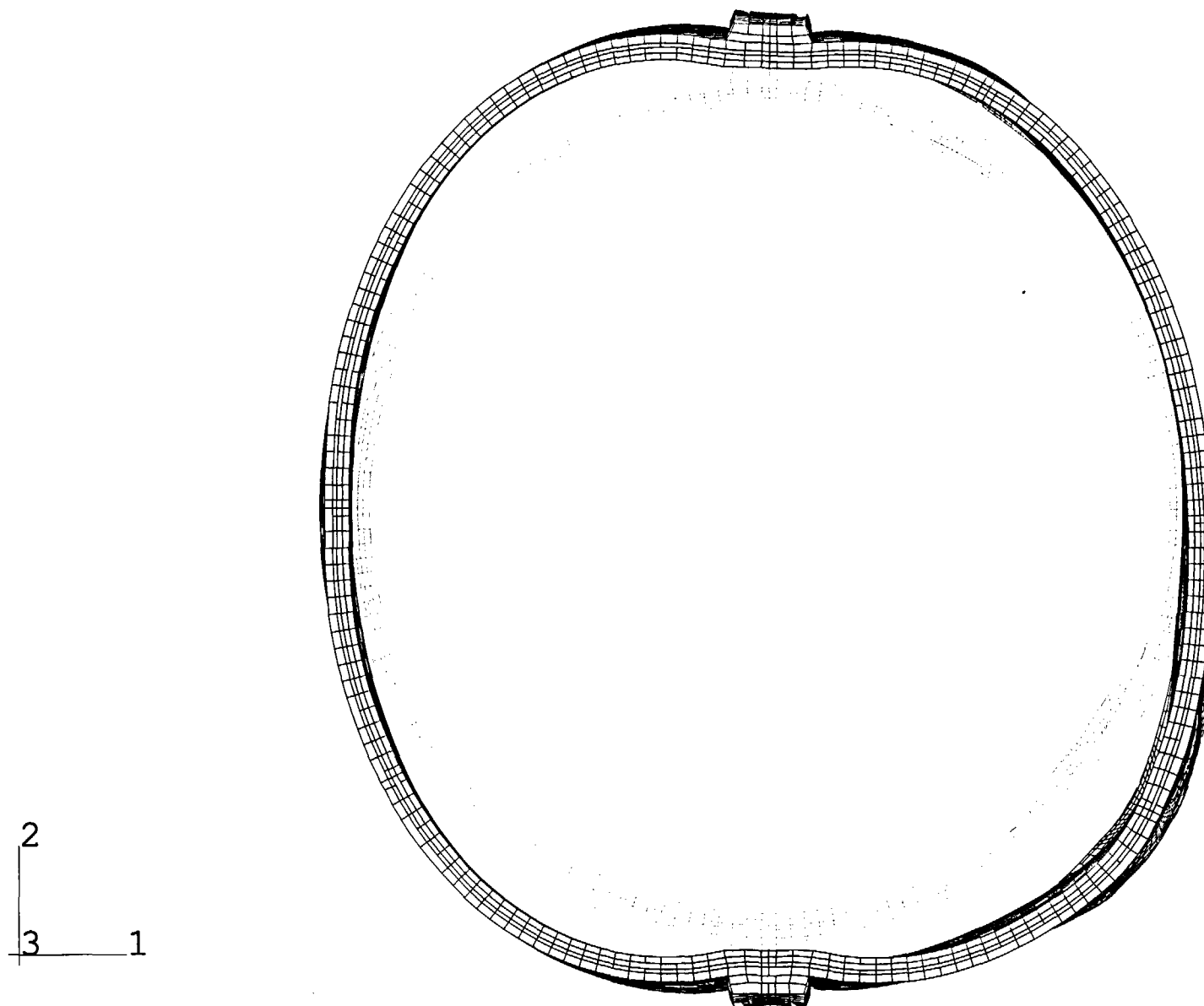


Figure 6-33. 3DCM Posttest Deformed Shape at $P = 3.8 \text{ Pd}$, Run 7 (mag. Factor = $10\times$)

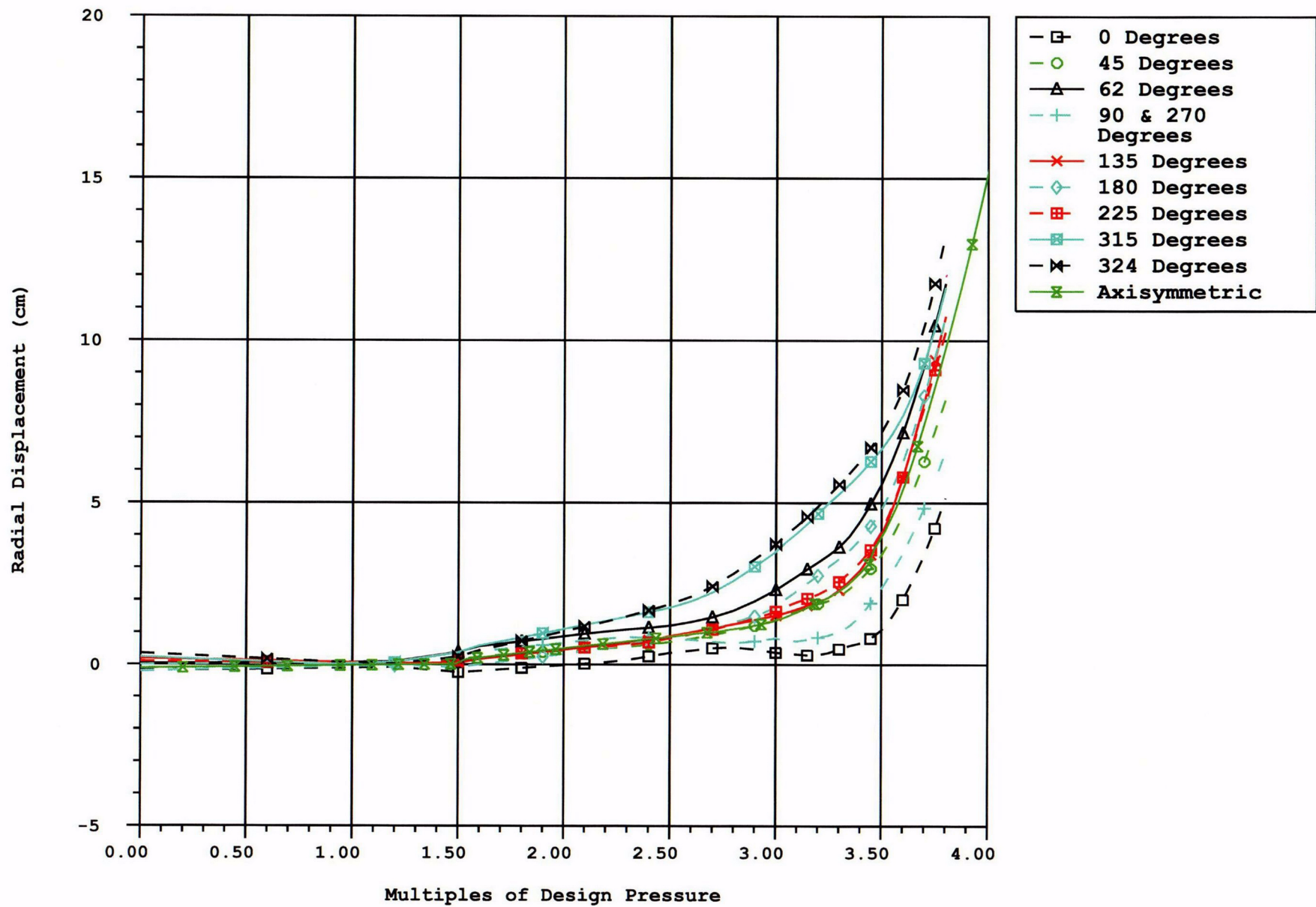


Figure 6-34. Radial Displacement at Elev. 4.7M, Posttest 3DCM Run 9 (Bi-directional Friction) Compared to Axisymmetric

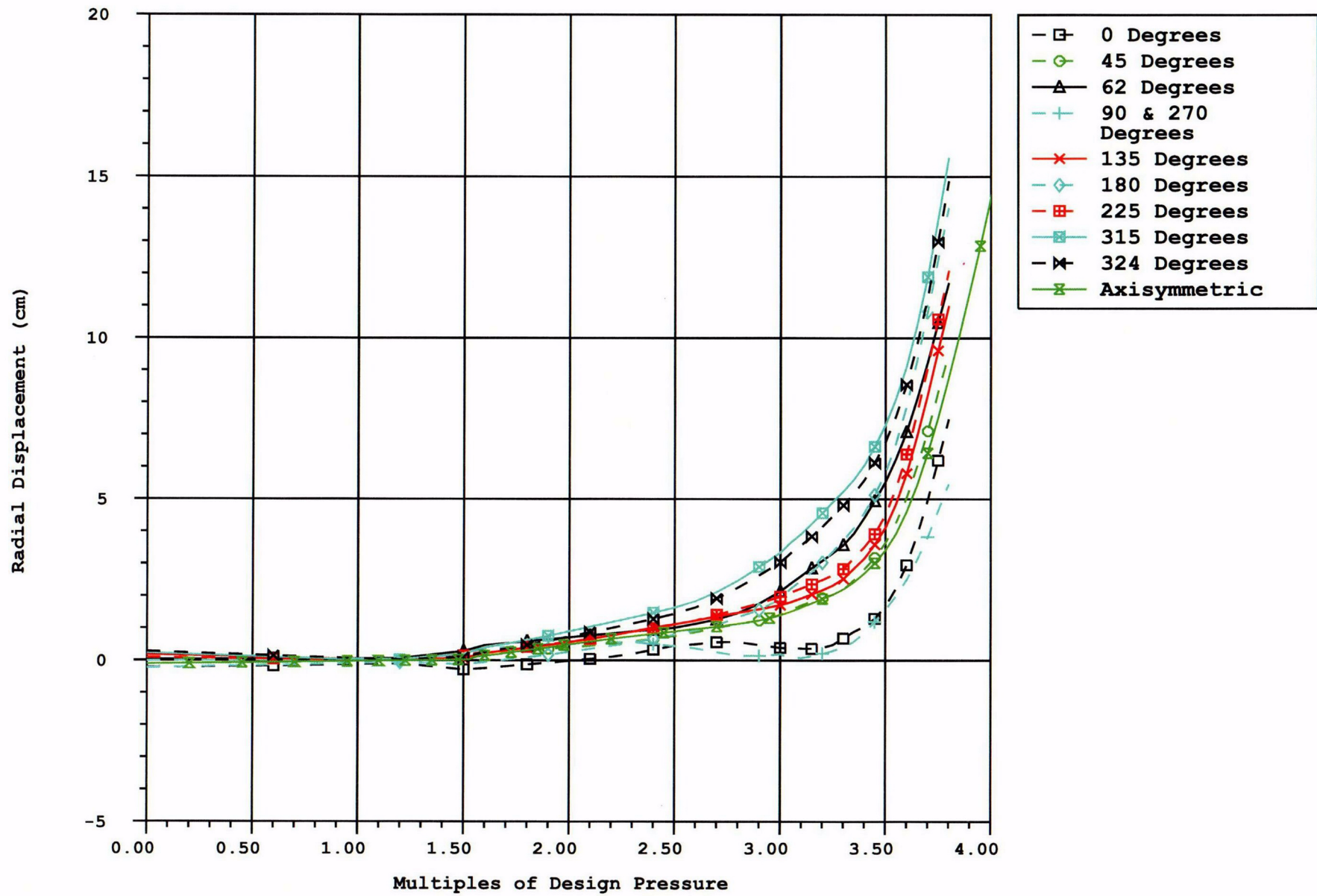


Figure 6-35. Radial Displacement at Elev. 6.2M, Posttest 3DCM Run 9 Compared to Axisymmetric

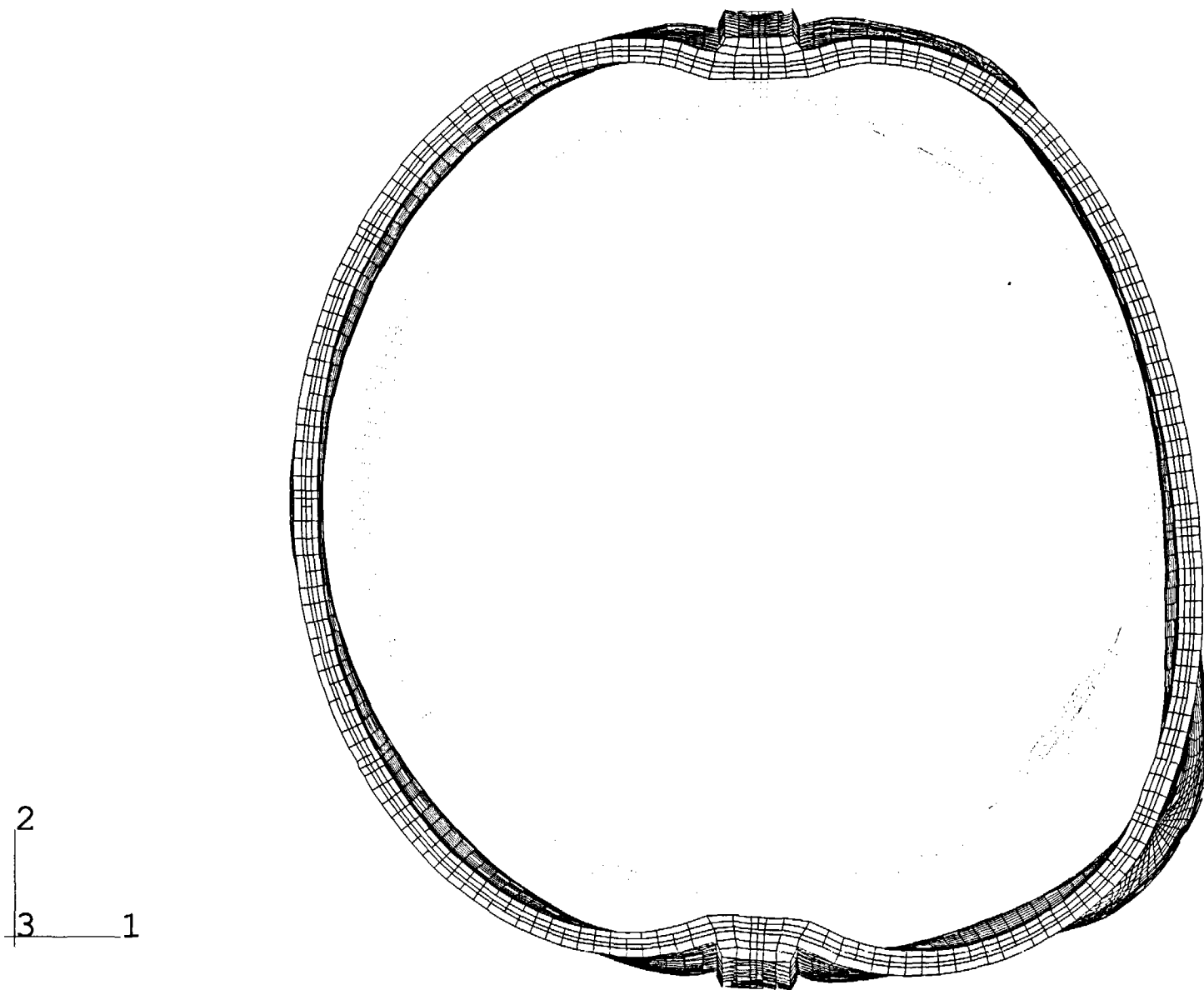


Figure 6-36. 3DCM Posttest Deformed Shape at $P = 2.5 P_d$, Run 9 (mag. Factor = 100x)

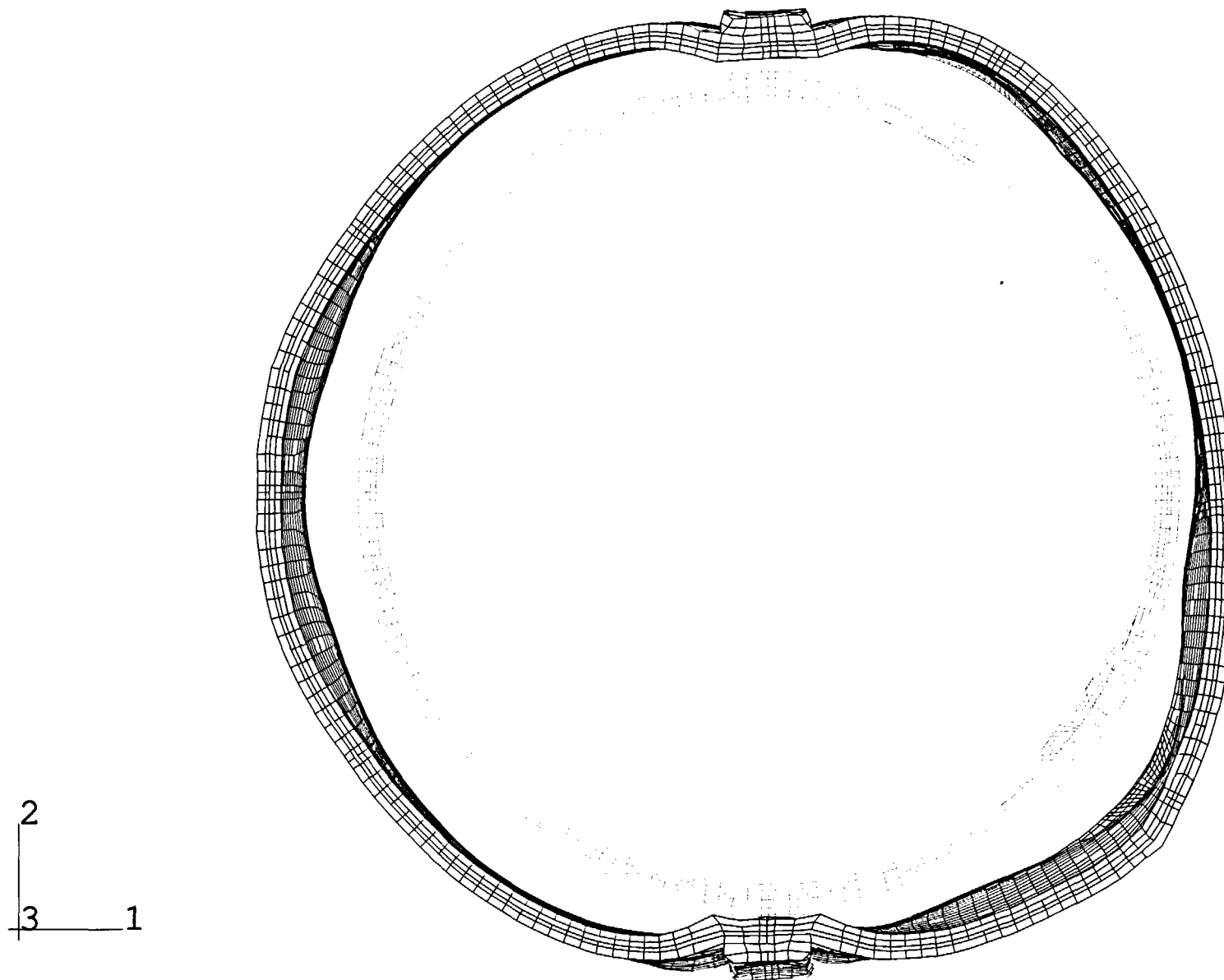


Figure 6-37. 3DCM Posttest Deformed Shape at $P = 3.8 \text{ Pd}$, Run 9 (mag. Factor = $10\times$)

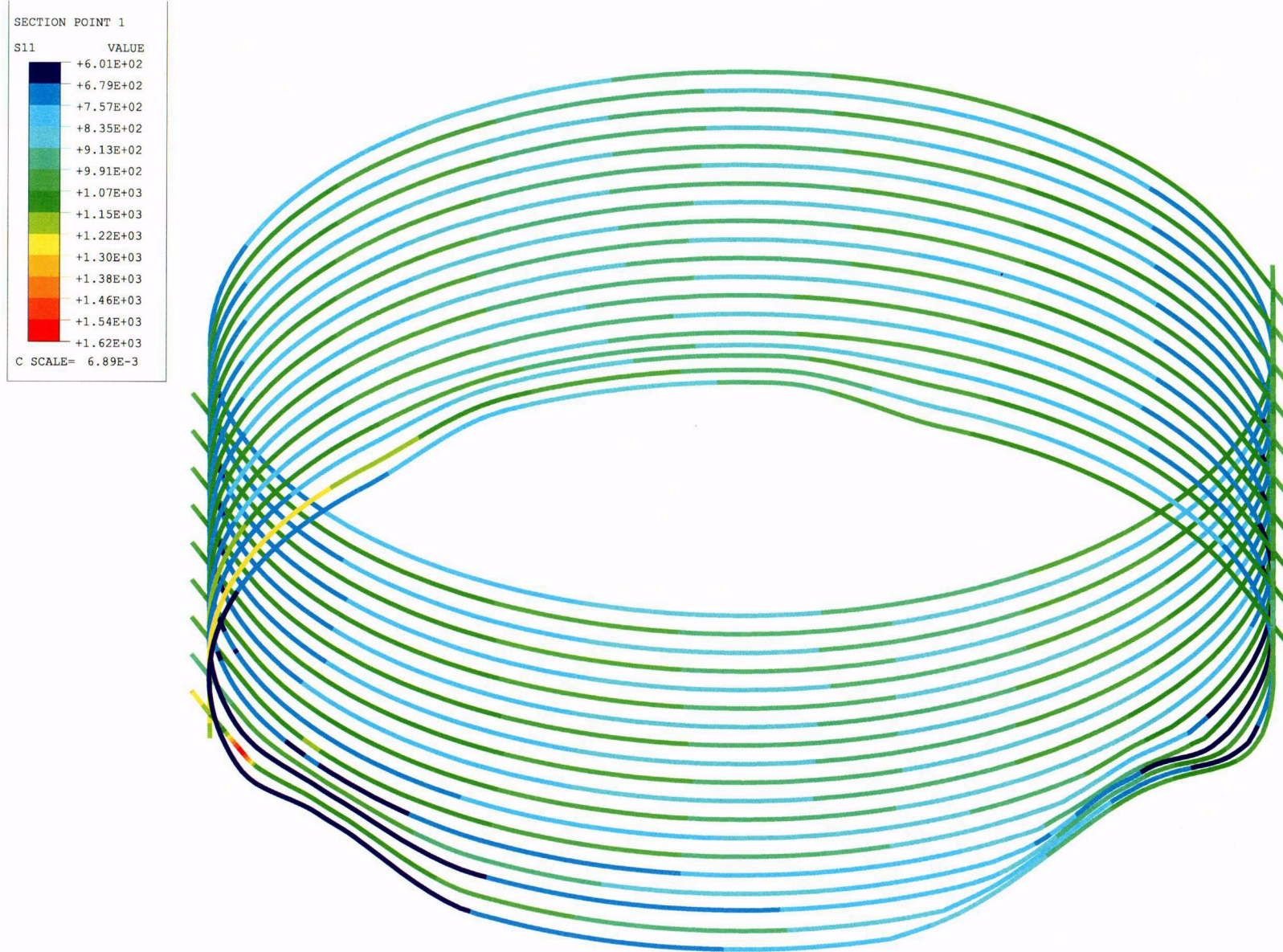


Figure 6-38. 3DCM Posttest Tendon Stress Contours at $P = 1.5 \text{ Pd}$, Run 6

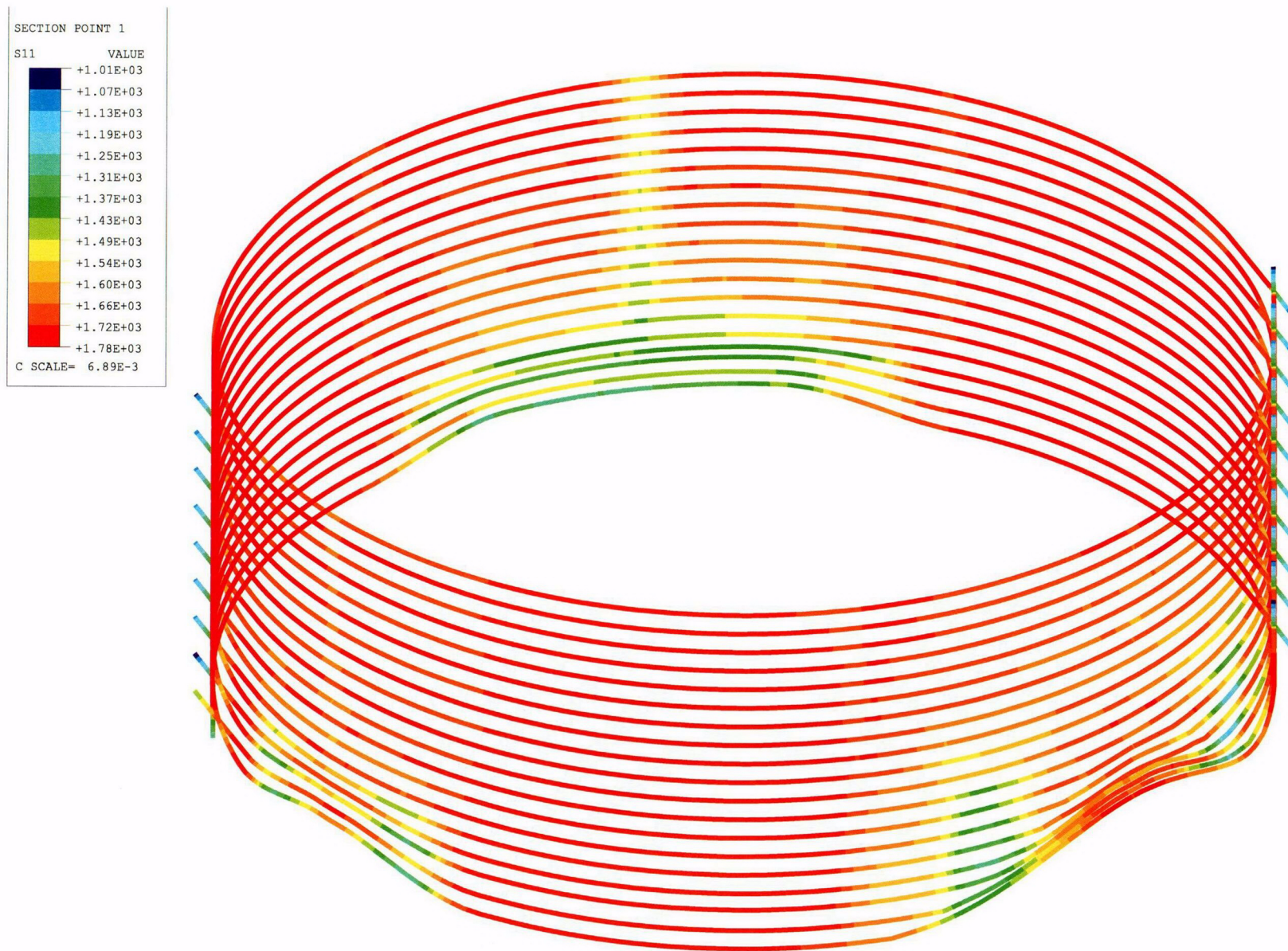


Figure 6-39. 3DCM Posttest Tendon Stress Contours at P = 3.5 Pd, Run 6

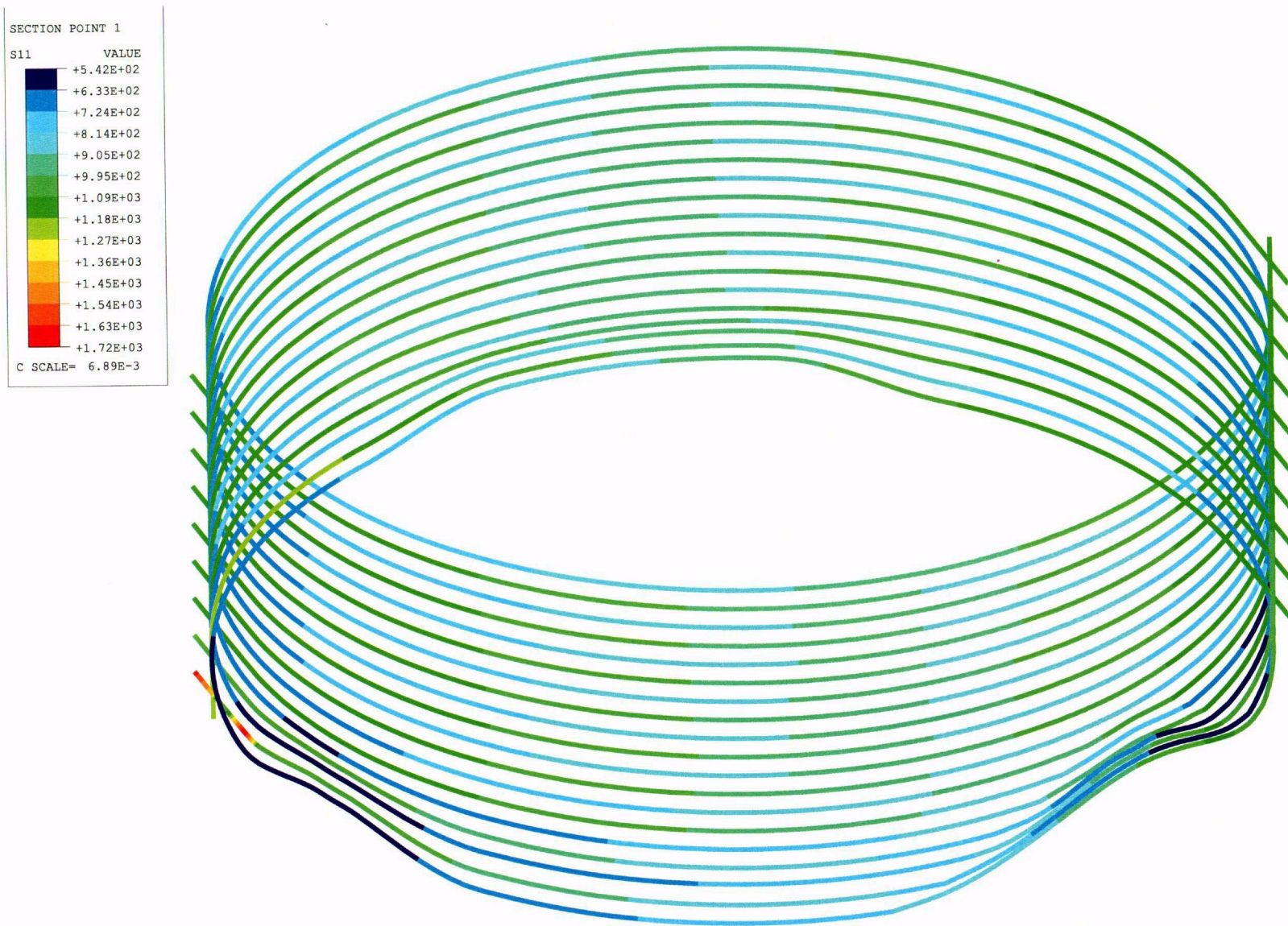


Figure 6-40. 3DCM Posttest Tendon Stress Contours at $P = 1.5 \text{ Pd}$, Run 7, Before Friction Element Modeling Modification

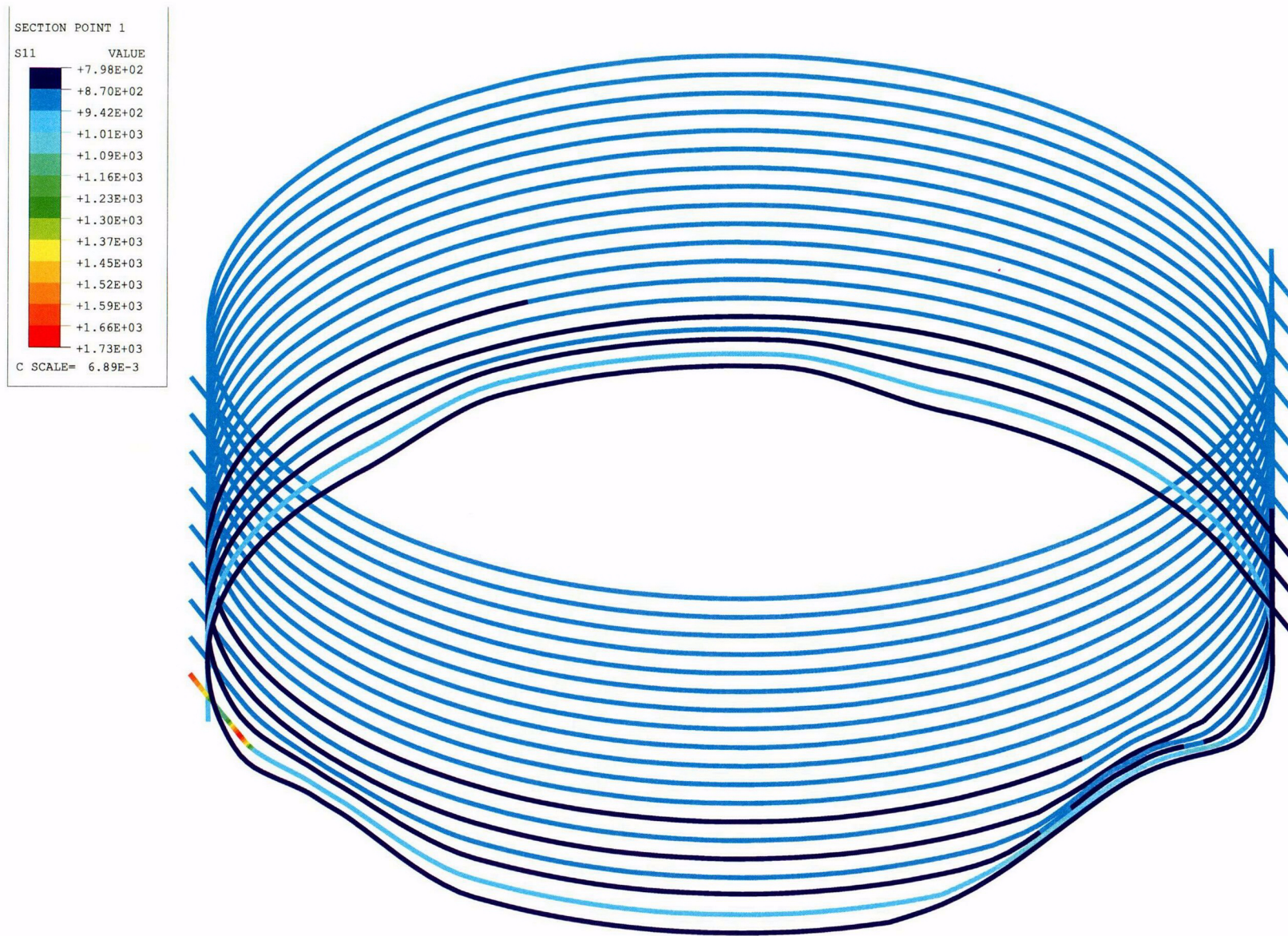


Figure 6-41. 3DCM Posttest Tendon Stress Contours at $P = 1.5$ Pd, Run 7, After Friction Element Modeling Modification

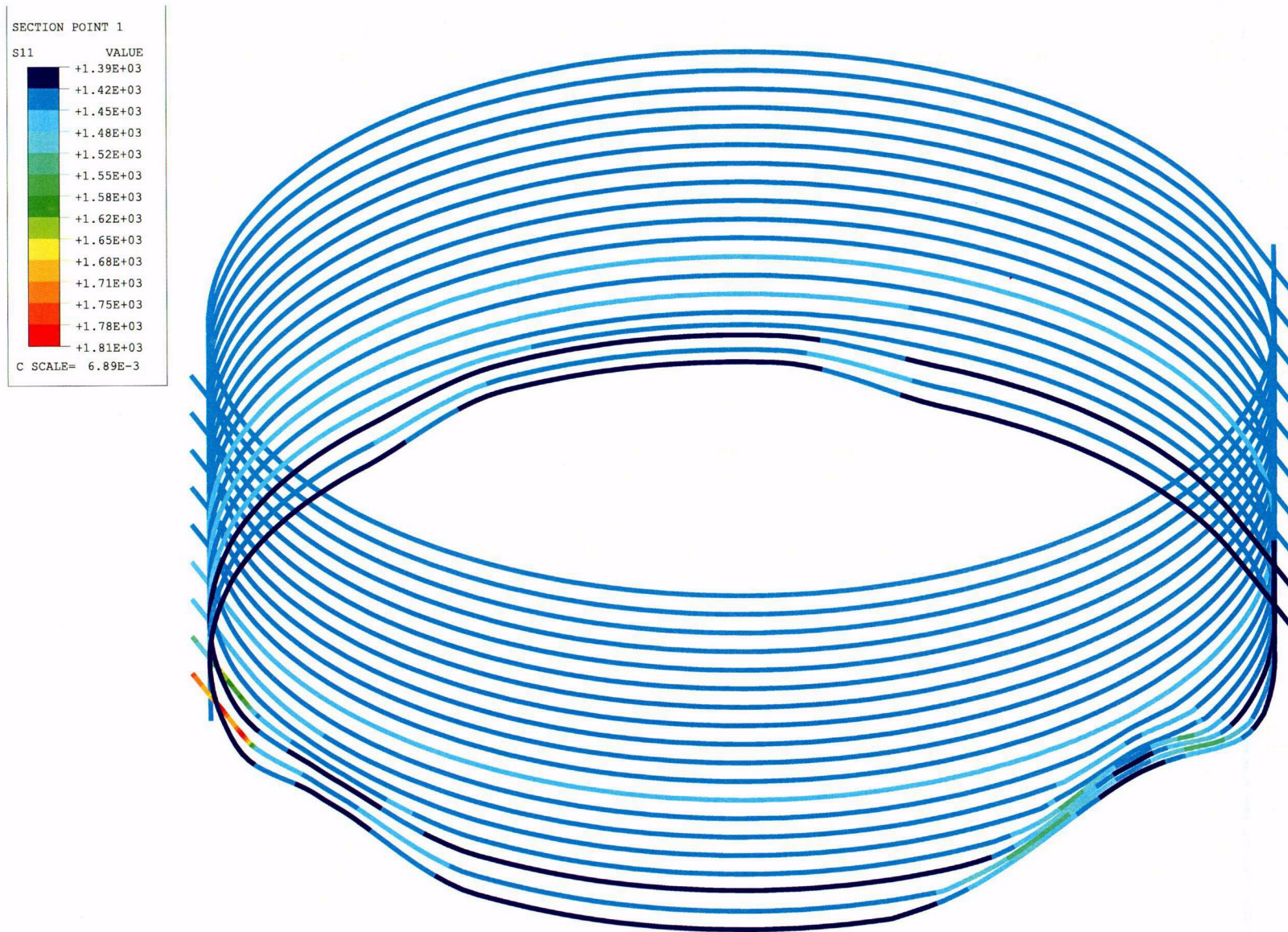


Figure 6-42. 3DCM Posttest Tendon Stress Contours at P = 3.5 Pd, Run 7